

Seventeenth Meeting of the NOAA Science Advisory Board's, Environmental Information Services Working Group (EISWG) August 28-29, 2017

SSMC 3 Conference Center, Room 4527, 1315 East-West Highway, Silver Spring, Maryland

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Agenda

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August 28-29, 2017

SSMC 3 Conference Center, Room 4527
1315 East-West Highway
Silver Spring, Maryland

Teleconference: 866-730-7697 Participant Code: 3711498

Monday, August 28, 2017

TIME	TOPIC	SPEAKER/FACILITATOR	EXPECTED OUTCOME
9:00 – 9:30	Meet and Greet	<i>All</i>	
9:30 - 10:00	Welcome, Introductions, and Overview	<i>John Snow, EISWG Co-Chair</i>	<i>Adoption of Agenda Introduction of New Members Status of EISWG</i>
10:00 - 10:45	Update on SAB Activities	<i>Cynthia Decker, Executive Director NOAA SAB</i>	<i>Informational and open dialogue. Update on working group process and guidance.</i>
10:45-11:00	Break		
11:00 – 12:00	Overview of SAB Short-Term Topics	<i>John Snow, EISWG Co-Chair Bob Winokur, SAB Member Cynthia Decker, Executive Director NOAA SAB</i>	<i>Informational and open dialogue.</i>
12:00 - 1:00	Lunch Break	On your own	
1:00 - 1:45	Update on NOAA NWS	<i>Louis Uccellini, Assistant Administrator for NWS, NOAA</i>	<i>Informational. Updates on general NWS activities, issues, and priorities</i>
1:45 – 2:00	Overview of The Weather Research and Forecasting Innovation Act of 2017	<i>Robert Moller, Acting Director of the Office of Legislative and Intergovernmental Affairs</i>	<i>Informational.</i>
2:00 – 2:20	The Impact of The Weather Research and Forecasting Innovation Act of 2017 on NOAA Line Offices	<i>Louis Uccellini, Assistant Administrator for NWS, NOAA Craig McLean, Assistant Administrator for OAR, NOAA Steve Volz, Assistant Administrator for NESDIS, NOAA</i>	<i>Informational.</i>
2:20 – 3:30	Discussion of The Weather Research and Forecasting Innovation Act of 2017 impact on NOAA Line	<i>NWS, OAR, NESDIS Assistant Administrators All EISWG Members</i>	

	Offices		
3:30 – 4:00	Adjourn	<i>John Snow, EISWG Co-Chair</i>	
6:00	EISWG Dinner	<i>All EISWG Members and Guests</i> <i>8407 Kitchen Bar</i> <i>8407 Ramsey Ave, Silver Spring, MD 20910</i>	<i>EISWG Members, NOAA Participants, Guests</i>

*EISWG member

Tuesday, August 29, 2017

TIME	TOPIC	SPEAKER/FACILITATOR	EXPECTED OUTCOME
8:00 – 8:30	Welcome, Introductions, and Review of Results and Actions from the Previous Day	<i>John Snow, EISWG Co-Chair</i>	<i>Review of previous day results and actions.</i>
8:30 – 10:00	EISWG Work Plan, Discussions, and Next Steps	<i>John Snow, EISWG Co-Chair</i> <i>All EISWG Members</i>	<i>Update work plan</i>
10:00 – 10:15	Break		
10:15 – 11:00	Membership Discussion	<i>John Snow, EISWG Co-Chair</i> <i>All EISWG Members</i> <i>Cynthia Decker Executive Director</i> <i>NOAA SAB & NOAA NWS Representatives</i>	<i>Informational. EISWG members review the process for nominating new members and provide input on possible names for EISWG membership.</i>
11:00 – 12:00	NOAA BIG Data Initiative	<i>Ed Kearns- Chief Data Officer</i> <i>NOAA Office of the Chief Information Officer [invited]</i>	<i>Informational</i>
12:00 – 1:00	Lunch Break	<i>On your own</i>	
1:00 – 2:00	Future Architecture of NESDIS after JPSS and GOES	<i>Karen St. Germain, Director,</i> <i>Office of Systems Architecture and Advanced Planning</i> <i>NOAA/NESDIS</i>	<i>Informational</i>
2:00 – 2:15	Summary and Adjourn	<i>John Snow, EISWG Co-Chair</i>	<i>Review actions</i>

Attendance

EISWG Members in attendance:

Dr. Tom Altshuler, Teledyne Marine
Mr. Ron Birk, The Aerospace Corporation
Dr. Ann Bostrom, Univ. Washington
Mr. Eddie Hicks, Morgan County, Alabama
Dr. William Hooke, American Meteorological Society
Dr. Kevin Petty, Vaisala Group
Mr. Jonathan Porter, AccuWeather
Dr. Mohan Ramamurthy, UNIDATA/UCAR
Dr. Cheryl Rosa, U.S. Arctic Research Commission
Dr. Jennifer Read, University of Michigan
Dr. Bob Weller, Woods Hole Oceanographic Institution
Dr. May Yuan, University of Texas - Dallas
Ms. Jean Vieux, Vieux & Associates, Inc.
Dr. Xubin Zeng, University of Arizona

SAB Liaison:

Mr. Robert Winokur, Retired NOAA and the Navy (SAB Liaison)

EISWG Members unable to attend:

Dr. Justin Sharp, Sharply Focused
Dr. John Snow, Univ. Oklahoma (Emeritus)

Presenters and Guests:

Dr. Louis Uccellini, Assistant Administrator for NWS, NOAA
Mr. Craig McLean, Assistant Administrator for OAR, NOAA
Dr. Steve Volz, Assistant Administrator for NESDIS, NOAA
Dr. Karen St. Germain, Director, NESDIS Office of Systems Architecture and Advanced Planning
Mr. Robert Moller, Acting Director of the Office of Legislative and Intergovernmental Affairs
Dr. Ed Kearns- Chief Data Officer NOAA Office of the Chief Information Officer
Dr. Cynthia Decker, Executive Director, NOAA Science Advisory Board
Ms. Elizabeth Akede, Staff, NOAA Science Advisory Board
Ms. Andrea Bleistein, NWS Office of Organizational Excellence
Mr. Peyton Robertson, Acting Director, NWS Office of Organizational Excellence
Ms. Mary C. Erickson, Deputy Director, NOAA NWS
Dr. Hernan Garcia, NOAA NESDIS/NCEI
Dr. John Cortinas, NOAA OAR/OWAQ
Mr. Matt Borgia, NOAA NWS
Ms. Jennifer Sprague-Hilderbrand, Social Science Cross-Cut Lead, Office of Planning and Programming for Service Delivery, NWS

John Snow requested the assistance of Jean Vieux as acting chair of the meeting since he was unable to be present.

Update on SAB Activities

Cynthia Decker, Executive Director NOAA SAB

Cynthia Decker provided an overview of NOAA Science Advisory Board (SAB) activities that consisted of the following four points:

1. The next meeting of the SAB will be on Thursday, August 31. The meeting will be a telcon focusing on: SAB next steps for short-term topics; the review of SAB working groups; and an informational briefing on the Weather Act.
2. Partnership Policy Update: In March 2016 Lynn Scarlet transmitted the EISWG review of the NOAA policy on partnerships to Kathy Sullivan. The National Weather Service (NWS) will provide a response to this report at the October 30-31st SAB meeting.
3. Review of SAB working Groups: The revised subcommittee concept of operations includes a periodic review of standing working group in conjunction with the SAB charter renewal process. This process includes the understanding of working group activities, a reviewing working group developed products, and questions to working group chairs, SAB and NOAA working group liaisons. The SAB will consider a report based on this information during its upcoming meeting on 8/31.
4. Short term Topics for SAB Advice: At the April SAB meeting, SAB identified a sub-committee to identify interim topics for SAB investigation. The sub-committee developed three topics: 1) value of information; 2) benefits of large scale ecosystem restoration; and 3) enhancing/harmonizing the delivery of environmental services across NOAA. The SAB plans on addressing each topic sequentially beginning with topic one at its October 2017 meeting.

The following discussion address topics such as: how the EISWG can best support SAB's short-term priorities (we should suggest those in our letter); what the timeline might be for the work (short since SAB is anticipating its priorities may change when an Administrator is named); how the word "value" is defined by SAB (certainly more than economic value and with an emphasis on societal value – how info is used, impact it has, how it changes behavior – over scientific value); what is NOAA's goals for asking these questions and how will NOAA use the information to make decisions (the memo emerged out of a topic analysis based on SAB speakers, and lists provided by Ben Friedman and Kathy Sullivan – so SAB has not thought deeply/strategically about these issues).

In addition, several participants made the case that NOAA needs to defend its work and its budget, as does any agency. And it is good if NOAA is able to tell OMB or Congress that this is the value of the information we provide and these people/groups/organizations will care if our budget is cut. Another aspect of the discussion was about the changing value of information due to advances in technology that have allowed big data to take on more intense societal roles.

Overview of SAB Short-Term Topics

Bob Winokur, SAB Member

Cynthia Decker, Executive Director NOAA SAB

(Jennifer Read/Robert Weller)

April 2017 SAB meeting had a subcommittee formed to advise on short-term topics. They identified three topics: 1) Value of information; 2) Value of Ecosystem Restoration; 3)

Enhancing and harmonizing the delivery of services across NOAA. In a July telecon, the SAB decided to address these three topics in order.

This discussion played off the SAB “gang of four” white paper as well as a draft response letter John Snow had developed. The latter was the result of consulting EISWG via email after he sat on a June SAB telecon. Among the aspects of the topic discussed:

- Do we narrow our focus or address all three topics, given that SAB is focusing on these sequentially?
- EISWG’s need to hear from all NOAA line offices, not just NWS in light of charge given under the new legislation.
- The perhaps unique role NOAA plays in supporting and archiving long-term data sets that might not have immediate, short-term value and could not, therefore, be supported by the private sector. The value of these long-term data sets should be part of the understanding of the value of information.
- EISWG’s need for greater clarity about what is hoped to be achieved by the SAB work, what it will be used for and the anticipated outcome. This will impact the way we approach providing assistance and resources for the effort.
- The need to return to the use of environmental as a modifier when we discuss information, we’re the Environmental Information and Services Working Group and we need to keep that focus.
- Considering when and how we revise EISWG terms of reference – only to reflect the legislation, or additional aspects?
- When considering value of information, EISWG really needs to know what SAB/NOAA already know (what information they have already), what processes are in place and how NOAA currently uses the value of information in its decision making processes. For example, how is the value of information factored in to a decision to undertake new activities and ramp down ones that are no longer valued (how do we know they are no longer valued and it’s possible to ramp them down?)

The NOAA liaisons were asked if they have thoughts on these last questions about how the value of information is used in decision making processes:

Mary Erickson: Valued the conversation EISWG had on understanding role of value of information in strategic planning, understanding what tools could be used on ROI discussion. On the Ecosystem services side, there was an extensive report on ecosystem services valuation by one of the other working groups. Getting to a nitty gritty application piece would be worthwhile. Thinking about what users have to say, what is untapped in terms of analytics, etc. these are all valuable in terms of tangible.

John Cortinas: From OAR perspective, there is a real value in terms of valuing research, the need for a value chain that describes the value to operations. Also, long-term investments are difficult and this effort could help those. Hooke: it’s really compelling when you ask what happens when we don’t do this research.

Discussion included how EISWG could help. The motivation of SAB and NOAA for asking could help our understanding of the request. Why is this important and how would the resulting information be used? Is this need as a budgetary defense for NOAA? It was suggested that future

speakers could be identified that could explain how NOAA currently values data. The EISWG could share individual comments of how members see the value of NOAA information in their organization. In the end, the discussion focused on the need for NOAA to provide much of the response to this topic. The consensus is reflected in the EISWG letter to the SAB.

Update on NOAA NWS

Louis Uccellini, Assistant Administrator for NWS, NOAA

Louis Uccellini's presentation led with the Global Risks Landscape 2017 "Impacts Diagram" from the World Economic Forum in Davos. The upper right of the graph (high likelihood/high impact) illustrated the importance of extreme weather events and water crises and risk to global economies. An emphasis on NOAA's strategic outcome: "Ready, Responsive, Resilient" which underlined the importance of connecting forecasts to decisions was made in connection with these impacts.

Impact-based decision services (IDSS) both change the way NWS works, as well as the nature of their products. Changes include becoming more oriented towards an earth systems framework, integrating social science, understanding decision-makers' needs before/during and after events, connecting observations and forecasts to "Key Decision Points" and determining how success is measured (a key point for collaboration with EISWG). A comparison of severe weather outbreaks from 1974 and 2011 tornado outbreaks was made, illustrating some progress but a similar number of deaths (underlining the difficulty present in measuring success). These two tornados were then compared to a 2017 tornado that had over a 4 years of outreach preceding event. No fatalities experienced, but much work was needed to get to that point.

FY2017 portfolio related to the "WRN Ambassador Program" were also presented, highlighting activities on observations, science and tech integration, facilities, dissemination, central processing and analyzing/forecasting and support areas.

From hours to seasons/years, NOAA is now dependent on a multi-model approach, with a substantial focus on ensemble systems to characterize the uncertainty of forecasts for decisions support. A suite of national and global models was presented via graph. However, the current Global Spectral Model (GFS) is being replaced with a new dynamic core (FV3) but the forecast system will still be named the Global Forecast System (v14) which is designed to unify products. NOAA is one of the deployment agencies for the National Strategic Computing Initiative. Links to actions in SAB on compute needs—this will be intertwined with this effort. The Weather Research and Forecasting Innovation Act (2017) will have a profound impact on NWS – seasonal/sub-seasonal (S2S), USWRP, HFIP, tornados, rainfall and decision support and social science. Dr. Uccellini finished by underlining the unmet need for improved IDSS capabilities in every local office. IDSS for water does not equal IDSS for weather. Nor does urban equal rural (initially urban was emphasized because of bulk of population present, but many decisions made in rural areas are made more complicated by dispersed population). Section 101 of the Weather Research and Forecasting Innovation Act of 2017 (WRFIA 2017), signed into law on April 18th, 2017, is directed towards the NWS's mission. More discussion is needed about what this means to NWS. To support IDSS, NOAA is now working with federal/state/tribal governments. NOAA

is also engaging more with the NAS on building a weather-ready nation. Key NWS focus includes:

1. Improve forecast process
2. Enhance science and technology capabilities
3. Engaging the broader enterprise

NWS is engaging with National Academies of Science, who want to do a decadal review. It is currently being suggested; why not focus on the Act and its implementation to focus the Enterprise on moving together toward implementation of the law?

This will require sustained commitment to science, models – and continuing to evolving NWS, which needs to be collaboratively with the Enterprise.

Overview of the Weather Research and Forecasting Innovation Act of 2017

Robert Moller, Acting Director of the Office of Legislative and Intergovernmental Affairs

The Act took several years to negotiate. Passed on April 18, 2017, it represents the most comprehensive weather-related legislation since the Weather Service Modernization Act of 1992.

Title 1: focuses on public safety improvement, weather research and forecasting innovation program, tornado warning and improvement extension program, codifies hurricane forecast improvement plan, weather R&D program, observing system planning (use of OSSE's)/simulation experiments and reauthorizes USWRP.

Title 2: S2S forecasting. Requires NOAA to develop and internet-based clearinghouse to make info available to public and “core partners”. Also calls on NOAA to work with DoD and DHS, and also to determine how collected data may be used to predict drought, floods, etc.

Key priority for senate was around sub-seasonal and seasonal forecasting, which includes:

- Foundational forecasts –temp and precipitation at national and regional levels and make it available to partners in order to connect to decisions
- The impact of these forecasts on droughts & floods conditions

Title 3: Weather Satellite and Data Innovation. Commercial weather data to be collected, including purchase of commercial weather data and placement of instruments on co-hosted government or private payloads. Also requires a strategy for procurement for this data.

Title 4: Federal weather coordination. EISWG is codified to provide advice on prioritizing weather research initiatives, emerging technologies and opportunities to improve communications between forecasters and the pub/fed/stats/local partners and private/academic sectors. Warning coordination meteorologists at the NWS offices. And Improves NOAA's communication of hazardous weather and water events. Improves hurricane hunter aircraft backup capabilities.

From the bill, it is clear that in a bi-partisan manner the legislative branch of the US government prioritizes and deeply cares about Weather Enterprise and what we are doing – the bill is a great opportunity to leverage that interest and excitement!

The Impact of the Weather Research and Forecasting Innovation Act of 2017 on NOAA Line Offices

Louis Uccellini, Assistant Administrator for NWS, NOAA

Craig McLean, Assistant Administrator for OAR, NOAA

Steve Volz, Assistant Administrator for NESDIS, NOAA

The Assistant administrators (AAs) from three line offices of NOAA discussed their perspectives on the Weather Act. Steve Volz (NESDIS AA) emphasized that the satellite and information data service at NOAA is covered in Title I (Sections 106 and 107) and Title III (Sections 301 and 302). Title I covers observing system planning (Section 106) and observing system simulation experiments (Section 107), including assessment of the observing priorities. The use of OSSE, analysis of alternatives, and other assessment tools are emphasized for observing system planning. OSSE is time-sensitive (i.e. the results can change over time), and is mandated for life-cycle cost greater than \$500M only. In an effort to convey the type of items that may or may not fit the mandate associated with the \$500M threshold, it was indicated that COSMIC 2 would not have to adhere to the OSSE requirement. He also emphasized the data requirement and priorities. If such analysis identifies data gaps, options (rather than a single option), including potential partnerships with the private sector, other government agencies, and international partners, should be provided to address such gaps.

Title III covers weather satellite and data innovation (Section 301) and commercial weather data (Section 302). NESDIS manages not just weather data but the whole environmental data. NOAA future satellite systems and data needs depend on independent studies of National Academies and NOAA's own architectural study committee. The potential need for another National Academies report will be decided after the current NASA/NOAA/USGS Decadal Survey Report is released later this year. Regarding the commercial weather data, two pilot contracts were signed with limited data delivery for NOAA's evaluation. The main issue at present is the data quality and the long-term stability of the data stream. However, as one EISWG member pointed out, without a long-term NOAA commitment, it is difficult for a private company to commit to the long-term stability of the data stream. Steve Volz went on to emphasize the importance of having flexibility in terms of how budgets can and should be used. Specifically, NESDIS should not be forced to buy commercial or invest in government-based systems. Instead there should be the ability to fund the best and most reasonable path forward, based on sound analysis.

Craig McLean (OAR AA) emphasized that the Weather Research and Forecast Innovation Act of 2017 (a.k.a. Weather Act) is too prescriptive in some ways. Nonetheless, it forces OAR and NWS to work together in a formal way. This is fortunate, as OAR and NWS are already working closely on weather forecasting. However, there is not sufficient collaboration when it comes to working with other Federal organization, something that can and should be improved. In terms

of OAR and NWS, specific leaders from OAR and NWS have been designated for easy coordination. Furthermore, OAR has supported weather service for decades, such as the development of multi-radar precipitation product, AWIPS prototype, FV3 dynamic core, HRRR regional model, social science on weather forecasting impacts. The NOAA sea grant spends several millions of dollars per year to improve risk communications and contributes to other social science research. OAR also provides substantial support to university researchers through the cooperative institutes and research grants.

The Weather Act calls for a number of actions linked to advancing forecasting capabilities in the United States. However, it is believed that OAR does not have enough resources to support researchers within OAR and from universities and the private sector for cutting-edge research and applications, as they relate to the new law. Without the support for this weather research, the weather service will suffer in the long run. One EISWG member suggested that, to get more resources to support weather research (not just weather service), more detailed justification based on value of information needs to be provided (e.g., at the next EISWG meeting). Regarding another member's question on the balance between the cooperative institutes and research grant program, Craig McLean mentioned that NOAA has reviewed its cooperative institute program, the program is nearly optimal for NOAA research, and encourages the involvement of multiple universities and private companies for a consortium in future cooperative institute competition.

Louis Uccellini (NWS AA) gave a very brief remark, as he already talked about the Weather Act in an earlier session (1:00-1:45pm Monday 8/28/2017). He repeated a few points: authorizing IDSS in the Weather Act; re-authorizing USWRP, HFIT, and tornado research; water was not emphasized (except water center) as much as weather; space weather was not included in the Weather Act either. In the earlier session, Dr. Uccellini did raise the concern that there was a lot in the Weather Act. For example, he noted that they are required to improve the forecast process, enhance the science and technology, and engage with the broad enterprise, all within existing resources. This will be challenging.

Discussion of Impact of The Weather Research and Forecasting Innovation Act of 2017 on NOAA Line Offices

Louis Uccellini, Assistant Administrator for NWS, NOAA

Craig McLean, Assistant Administrator for OAR, NOAA

Steve Volz, Assistant Administrator for NESDIS, NOAA

All EISWG Members

This portion of the meeting included a panel session with the Assistant Administrators, as well as Robert Moller, Acting Director of the Office of Legislative and Intergovernmental Affairs. Earlier in the meeting, Robert provided an overview of the Weather Act and its high-level implications on NOAA.

During the discussion session, it was noted that some language related to the topic of water was pulled from the Act. Thus, the law does not contain direct language on water and its importance in NOAA's mission.

One of the aspects of the law that was touched on is the amount of reporting required by the new law. The process by which the reports will be generated has not yet been determined, but the thought is that it makes sense to leverage previous experience and methodologies. For example, it would still be imperative to gather feedback via meetings and open forums such as those enabled by the American Meteorological Society. Furthermore, making such reports available for open comment periods should still be considered. It is important to maximize the involvement of the community as a whole. The point was made that NOAA, EISWG, and other working groups, should not get too hung up on the reporting requirements. The goal is to fundamentally identify and provide guidance on how to address the requirements outlined in Weather Act.

Some of the discussion centered on the research-to-operations (R2O) process. Dr. Uccellini suggested that a considerable amount of work and code development is done outside of NWS, and the adoption process is sometimes extremely difficult. In addition, there have been times that the resources have just not been available. For instance, in the case of the HRRR, the computational resources were not available until just recently that would enable the HRRR to be run operationally. In the example of the MRMS, documentation was lacking, which made implementation challenging. Besides (R2O) transition, O2R is equally important (which requests resources from NOAA and the will and interest of the broad research community).

There was discussion on the role of cooperative institutes in helping to address fundamental aspects of the law. What is clear is that there is no room to expand the role of cooperative institutes. It was expressed that it would be good to potentially see commercial interests also step forward to help fill gaps that may currently exist.

Given the demands placed on NOAA as a result of the Weather Act and the limited resources available to meet those demands, the question was raised regarding what the EISWG could do to help (the following concise and well-articulated bullets were captured by Andrea Bleistein during the discussion. These are also presented in the EISWG summary slide set)

- Dr. Uccellini asked for help on how to measure success: what is the intrinsic value of the forecast and IDSS? “It’s not the barometric pressure on a map.”
 - Engaging the National Academies of Sciences on - Focus on the Weather Act for NAS Roadmap Study found in slide 23
- Mr. McLean asked EISWG to characterize the nature of research investments that OAR needs to make. Weather Act designates less funding for weather research than currently provided. How does OAR divest properly? Can EISWG help?
- Dr. Uccellini said we have research that is needed and the whole community can contribute. EISWG needs to help by calling it out. It's a time for weather research.
- Dr. Volz stated that the value of making information available is the challenge for NOAA. How do we make it usable and accessible? Don't want to spend money to buy more data - want to make it available and that costs money. Data analytics and computing is important.

In addition to the aforementioned points, it was evident that there is a strong need to prioritize the types of research and development that should be conducted, as well as communicating its importance (Dr. Uccellini). Moreover, there is a need to ensure a robust integrated observing system that includes weather, water, and climate observations (Dr. Volv). Finally, it will be impossible to sustain what the agency is currently doing while addressing the requirements of the Act within the current level of resources (Mr. McLean). The EISWG should consider these issues from the perspective of advancing the entire enterprise regardless of which sector individuals might represent. In other words, what is best for NOAA, as well as the rest of the enterprise?

In terms of prioritizing research and technology activities, there are many National Academies reports on weather (some that include the involvement of former and current EISWG members) that provide recommendations and suggestions; however, NOAA doesn't have the capacity to implement all of them. AMS town halls may help NOAA to prioritize some of those recommendations. NOAA also prioritizes implementations by drawing upon existing practices (e.g., community efforts in model development). As the Weather Act covers time scales up to 2 years, climate is essentially covered as well in the Weather Act. The question is where to focus on and where to put research dollars.

Regarding the value of information, NESDIS focuses on making data more accessible and providing the one-stop shop. While archiving data is funded well, data service is under-funded at NESDIS. Existing data are under-utilized in a big way, and it may be more economical to make existing data more useful and accessible (than invest in more data). It was pointed out that the Big Data CRADA has not yet been proven. For OAR, it is also expensive to generate large amount of model data and provide the data access. Funding is needed to support more information technology work (including machine artificial intelligence). For NWS, large amounts of weather forecasting data are substantially under-utilized. There is some ongoing work with the Bureau of Economic Analysis to do some case studies in an attempt to demonstrate the value of data.

Work Plan, Discussions, and Next Steps

Jean Vieux, Acting EISWG Chair

All EISWG Members

It was agreed that two task forces should be formed and there were volunteers to lead these:

1. General Membership Task Force- John Snow, Jennifer Read, Cheryl Rosa and Kevin Petty
 - a. There is a need to pursue membership as tasked by the Act
 - b. The task force will do a subject expertise analysis, request nominations, consider the Act and review our terms of reference for an October conference call.
2. First Annual Report (in response to Act) Task Force:
 - a. Letter response to the NOAA response to the PPP- John Snow, Ron Birk, Ann Bostrom and Jean Vieux
 - b. A February report would give SAB an opportunity to review and submit

Annual working group activity report-

- This is the primary responsibility of co-chairs supported by the Working Group
- The report is a broad report; plans are to go forward with what the EISWG did this past year, including membership changes

The modification to the draft letter to the SAB was transmitted to John Snow for review and delivery.

The Next Meeting Date, Location, Agenda Plan

- Telecons:
 - October Membership discussion and input for gathering nominations
 - December finalize membership and send recommendation to SAB, topic 1 VOI follow up , Private Public Partnership Policy response discussion
- Silver Spring Meeting
 - February agency liaisons panel discussion with set of questions ahead of time (how you set priorities, etc.) gain information to develop recommendations

Membership Discussion

Jean Vieux, Acting EISWG Chair

All EISWG Members

Cynthia Decker, Executive Director, NOAA SAB

NOAA SAB & NOAA NWS Representatives

Jean Vieux noted that two members were absent this meeting (John Snow and Justin Sharp), and reviewed what we covered on Monday:

- Membership
- EISWG Letter to SAB on topics to discuss
- Reports on the Weather Research and Forecasting Innovation Act of 2017, NOAA NWS activities, and the impact of the Weather Research and Forecasting Innovation Act of 2017 on NOAA Line offices
- Partnership policy response expected from NOAA/NWS and NESDIS this fall

She then introduced the discussion of our work plan, next meeting, and next steps:

- Date, location, agenda
- Finalize SAB letter today
- General membership – should we go forward on this or create a group?
- Terms of reference update
- Sub working groups for SAB request and Annual report?
- Annual report process – what should it be?

Date, location and agenda: The committee discussed timing of next meetings at multiple points during this session, in the context of SAB meetings and timelines; sequencing EISWG sub-working group committee activities; and consideration of congressional timelines and when to deliver the annual report requested from the EISWG by the Weather Research and Forecasting Innovation Act 2017. As summarized by the acting chair, Jean Vieux, in the closing session, the committee agreed on three meetings:

1. October teleconference to discuss:

- a. Implications of the Weather Research and Forecasting Innovation Act 2017 for the EISWG terms of reference (TOR), and new member selection for EISWG (also tasking members to nominate new members); and
 - b. Outcomes of the SAB deliberations this week on topics for SAB discussion and its response our EISWG letter offering for the EISWG to contribute to Topic 1 on VOI
2. A teleconference or in-person meeting in December (after AGU?) to discuss EISWG membership; NOAA response to EISWG report on the Policy on Public-Private Partnership (PPP), and the agenda for a February EISWG meeting; and
3. A February meeting to hear from NOAA line offices and headquarters. The committee discussed possible agenda items for the February meeting, including:
 - a. asking NOAA (line offices and research council, for example) to report on VOI and its (formal) role in strategic planning at NOAA;
 - b. Asking NOAA to present its progress on goals set out in the Weather Research and Forecasting Innovation Act of 2017, and/or;
 - c. asking the line offices to report on the value of their services, and if they have adequate resources to produce those services.

The committee agreed to provide NOAA line offices with a set of questions to prepare responses to, well in advance of our February meeting, and discussed a more specific initial set of questions that we might consider asking NOAA to address regarding setting priorities and VOI, including: *What are your research priorities, and how do you set those priorities? How do you consult with the private and academic/nonprofit sectors on those priorities?* It was noted that NOAA has a five-year strategic plan out now.

Membership and Terms of Reference: Membership discussion might want to come after reviewing our terms of reference (TOR), since if those end up changing, they could influence the characteristics we are seeking in new members. EISWG may want to ask one of the new members to serve as co-chair. There was a discussion of the stipulation in the Weather Research and Forecasting Innovation Act of 2017 that the EISWG should select its own chair/co-chairs from among its members, going forward. Service on EISWG is limited to two terms, with the possibility of a one-year extension. Eddie was reappointed in 2015. Bill was appointed in 2015. Justin, May and Xubin were all appointed at the same time. To reappoint a committee member, EISWG submits to the SAB justification for why we want to reappoint the member. We can also extend for a year and put that through at the same time. We can ask that Eddie be extended another year, and that those four whose terms expire in 2017 be reappointed. And we have two new members to appoint. In this context, SAB staff noted that the SAB will likely be asking working groups to review their Terms of Reference (TOR). The membership discussion resulted in the designation of a sub-working group (John Snow, Jennifer Read, Kevin Petty and Cheryl Rosa) to identify (redline) the parts of the Weather Research and Forecasting Innovation Act of 2017 that pertain or could pertain to EISWG terms of reference and membership, to examine the characteristics of the current membership of EISWG in light of these and do a gap analysis, and to make recommendations to the committee for the nomination process, to discuss in the October teleconference. The aim is to have new members in place for 2018.

Terms of reference (charge from the current EISWG TOR):

- To provide advice on improving communication among the sectors,

- To provide advice on incorporating scientific and technical capabilities to enhance NOAA products and services,
- Provide a sounding board on NOAA's Policy on Partnerships in the Provision of Environmental Information, and
- Evaluate NOAA effectiveness in responding to advice received from EISWG, and the environmental information enterprise as a whole.

(approved by the SAB February 2013)

Annual report process: After distinguishing between the annual activity report, which EISWG delivers to the SAB every year (EISWG chair(s) take the lead on developing this), and the annual letter to congress on NOAA's progress on adopting the working group's recommendation (specified in the Weather Research and Forecasting Innovation Act 2017), the committee agreed that NOAA's response to the EISWG PPP report, which is anticipated in October, would be an appropriate topic for EISWG's first annual letter to congress, given that the public-private partnership policy ties in nicely with what is in the Act. A sub-working group consisting of EISWG members who helped develop the EISWG PPP report (Ron Birk, John Snow, Jean Vieux and Ann Bostrom) was tasked with taking the lead on crafting the letter to congress (to be delivered to the SAB) after hearing back from NOAA.

EISWG Letter to SAB on topics to discuss: The committee revisited the letter, following on discussions from the previous day, and revised it to focus on the first topic, VOI. EISWG thinks VOI should be a great focus for NOAA leadership and would like to hear what part it plays in their planning process and what steps they are taking to make it more effective. The letter modification focused on the following two thoughts 1) Put most of the effort, at least initially, on NOAA, and
2) Tie the efforts and our role to the Weather Research and Forecasting Innovation Act.

In the remaining time, the committee discussed the *National Weather Service Enterprise Analysis Report: Findings on changes in the private weather industry*, June 8, 2017 from McKenzie (with NOAA NWS support; the report was completed while McKenzie was doing the workforce analysis that they were contracted to do for NWS). The committee noted that the report does a very good job of recognizing the changing landscape and participation of the entire weather enterprise, and seemed to represent well both larger and smaller entities in the weather enterprise. One committee member suggested that the report assumes too definitively that the private sector will not do certain things. The committee appreciated the report highlighting the critical role of America's weather industry in the entire value chain and how it is evolving, and that the report does a nice job of leaning forward into the future - considering automation, AI, and that the value of information is becoming more embedded in the overall system of things.

The committee also recognized that the report's assessment of the value of the weather enterprise is an important contribution, as a lot of that information is not publicly available. Someone noted that in a public discussion subsequent to the report's release the private sector suggested this was a gross underestimate of the value of the entire weather enterprise. In response to committee concerns that the source/author(s) and basis for the report content and conclusions was not noted in the report itself, NOAA staff members reported that the report was compiled based on publicly available information and through interviews, and that it went through an arduous internal review process.

Following a discussion of how NOAA used the report successfully to trigger discussion at the partners meeting in Wisconsin, committee members noted that at the summer partners meeting there remained significant concerns about the way IDSS is being implemented with regards to entities beyond government agencies. There was a suggestion that EISWG might provide some thoughts on this for NOAA, and that the way in which IDSS is pursued from an enterprise could use more conversation. This led to a discussion of the importance of balancing efforts to protect the public good while rewarding innovation.

To paraphrase the committee member's words that closed this discussion: We heard from Craig McLean, Assistant Administrator for OAR, yesterday that we should take our hats off and not be biased in our approach. We all have biases, but our goal is to improve NOAA as a whole, as well as improve society and our community and how it deals with weather, water and other data and information. Hope we are all on the same page when it comes to that.

NOAA BIG Data Initiative

Ed Kearns- Chief Data Officer NOAA Office of the Chief Information Officer

Dr. Ed Kearns, NOAA Chief Data Officer (CDO), provided an update on the NOAA Big Data Project (BDP). The NOAA CDO position was created in March 2017 and Dr. Kearns is the first person to hold that position. Prior to assuming the CDO position, Dr. Kearns spent nine years at NESDIS/NCEI working on various data related projects. NOAA initiated the BDP 2015 to keep up with the increasing public demand for NOAA data in an era of flat budgets and growing data volumes in NOAA's archives (28.6 Petabytes in 2016, projected to increase to over 140 petabytes in 2030).

To explore a new financial model for public access to NOAA data holdings, NOAA signed identical Cooperative Research and Development Agreements (CRADAs) with five different organizations: Amazon, Google, Microsoft, IBM, and Open Commons Consortium. The basics of the three-year agreement were: a) the partnering organizations will provide open access to NOAA data to all; b) those organizations can monetize services associated with data, and c) NOAA will provide data and expertise to those vendors. The CRADA partnership leverages NOAA's subject matter expertise, the vast amount of storage available from the industrial partners, and cloud computing environment's scalable and on-demand processing capability. The goal of the BDP is to provide better, cheaper, more secure and wider access NOAA's data as well as accelerating data utilization and improving societal impacts and business opportunities. It was made clear that all existing NOAA data service outlets will remain but the BDP offers alternative approaches for data access and utilization and NOAA may recover costs for new or supplemental efforts, while collaborators may charge for value-added products and services. At this time, four of the five CRADA partners have public facing data services, but Microsoft has not yet stood up any services:

- <https://aws.amazon.com/noaa-big-data>
- <https://cloud.google.com/bigquery/public-data>
- <https://noaa-crada.mybluemix.net>
- <http://edc.occ-data.org>

NOAA has entered into non-disclosure agreements with all of the CRADA partners, and those partners are tracking usage on their platforms and sharing that information with NOAA.

The NEXRAD WSR-88D Level II radar data was chosen as the first data set to be hosted by the CRADA partners because of its popularity and widespread use, with the transfer of the entire WSR-88D archive in 2015 and all real-time data since then. Third-party collaborators such as Unidata and Climate Corporation were key to the success of the effort. Some of the early results from the BDP indicate that today about 80% of the data requests are being serviced through Amazon Web Services, resulting in a commensurate decrease in data access from NOAA/NCEI. In addition, the time to download the WSR-88D data has decreased dramatically for end users. Similarly, Google's BigQuery, which also provides NOAA data has seen an explosive demand for those data as 1.2 petabytes of weather and climate data, 30-100 times of NOAA data deliveries in that time, were accessed in just four months without any advertising about the availability of those data. Three of the BDP partners have also started making available GOES-16 data as of July 12, 2017, thanks to efforts by NOAA's Cooperative Institute for Climate and Satellites-North Carolina (CICS-NC) that is providing feeds of GOES-16 Level I ABI data from the NOAA ground systems to the CRADA partners. Currently, the above distribution is resulting in 30 seconds to 3 minutes of additional latency in the delivery of the data to the partners. Plans are also underway to move the National Water Model output, both 23-year reanalysis and realtime forecasts, to the collaborators. At this time, NOAA is seeking feedback from consumers on a number of issues including whether the BDP efforts meet the needs of users and if the BDP approach is making things easier for users.

Following the BDP presentation by Dr. Kearns, EISWG inquired about the next steps of the BDP. EISWG was informed that NOAA would like to extend the CRADA, possibly on a year to year basis. A number of outstanding questions surround the BDP approach, such as:

- How do we understand the Big Data market?
 - Are all NOAA's data commercially-viable in this model?
 - How can NOAA more systematically select datasets?
 - How to best transfer and steward numerous large, complex datasets?
 - How to ensure data authenticity?
 - How to deal with other real-time data, e.g. satellites, weather observations, coastal data, retrospective data from climate models and observations, and fisheries data
- What comes next, after the CRADA expires?
 - Should NOAA spin off new agreements or partnerships as the April 2018 deadline for the current CRADA nears?
 - Have we learned enough yet?

Dr. Kearns also mentioned that he is engaged in conversations with people from other agencies, including NASA, USGS, NRO, NGA, and the Federal Reserve Board. He also noted that at the moment 50% of the data usage on Amazon is staying on AWS, although that percentage may change in the future. Furthermore, he indicated that all NOAA line offices are engaged in the BDP effort and the effort has been sustained across the change in administrations as Open Data is still apolitical and has bipartisan support. An EISWG member noted that other met services around the world have taken notice of the NOAA BDP initiative. EISWG members, who have been charged with providing input to NOAA's SAB on the Value of Information (VOI),

requested future updates on the project and additional metrics that could be valuable in addressing the VOI effort. The group also discussed the cost of egress (charge for data transfer out of the vendor platforms to user locations) and ways to keep it manageable for users. Finally, he noted that there is no funding for the BDP effort, making it challenging to address some of the user issues.

Future Architecture of NESDIS after JPSS and GOES

Karen St. Germain, Director, Office of Systems Architecture and Advanced Planning
NOAA/NESDIS

The focus is on IDSS. There's a continuous cycle of observations to decisions and back. IDSS drives mission requirements through science and technology integration and R2O and then working through products and feedbacks/requests for improvement (O2R). To oversimplify: JPSS and GOES are the flagship satellites. Karen St. Germain, NOAA/NESDIS Director of the Office of Systems Architecture and Advanced Planning, made a presentation to the EISWG on "Future Architecture of NESDIS after JPSS and GOES." Karen St. Germain has been director of this new office for a little over a year. Her background includes NOAA and DoD. NOAA/NESDIS mission concerns lives and livelihoods. Contribute to this through improved initialization of models, but also search and rescue and other services. JPSS launched scheduled for November 10 2017. JPSS supports model initialization. GOES supports severe weather warnings.

Things are changing: technology adjustment, partnership adjustment driving changes in policy and requirements. Moving to fully coupled models including oceans and cryosphere. There is an increasing motion to commercial data provision. The agency is also moving toward dynamic global space-based observing system (including ground and flight systems).

Moving into world offering diverse multiplicity of satellite data platforms, instruments, not even taking into account private sector.

Why start now? Has to do with our fly-out charts for Polar and Geo. Current construct for GOES is GOES-East, -West, and -Spare. Have to launch something new as early as 2028. Not far away in terms of space infrastructure.

Build, borrow, buy space architecture; they considered all three options. Also looked at ground architecture and holistic analysis processes. Looking for flexibility, responsiveness, and other desired attributes.

Architecture analysis methodology? Customers give us mission objectives, translates into needed space platforms and instruments. NOAA relies on NOAA Observing Systems Council. But in addition to continuity they need a future-looking/oriented group. Want cost-benefit analytic approach, maximizing benefit for fixed investment. Evaluate a range of options: what can we do with all low-orbit architecture, with all private-sector sourcing, etc.?

They catalogued architecture options, costed these, but also looked at end-to-end costing out to 2050.

Repeated the process three times. After round 1, they reported implications back to NOAA senior Leadership (NOAA Observing Systems Council). Not trying to identify a winner but frame conversation /strategic decisions for NOAA leaders.

She provided an extensive list of value model objectives (both terrestrial-ocean, and space-weather).Some include a walk-away model; a high-end model; and options in between. Wanted to have everything compete its way back onto the architecture. Intended not to make decisions but develop analysis to be used by decision makers.

They also tied value model objectives into strategic objectives:

- Assurance of core capabilities.
- Compatibility with stable budgets.
- Assurance of all capabilities.
- Develop and maintain international partnerships.

Architecture next steps possibilities include:

- Pre-phase A (branches into commercial data buy, partner sources, programs of records). Next step feeds into Enterprise ground.
- Small satellites and small sensors. They may be more affordable and resilient but challenges and potential shortcomings in meeting product specifications. Looking at microwave sounding, to look at feasibility.
- An aside on commercial weather data. “NOAA shall do this.” Now test driving. Codifying their process for assessing new commercial capabilities, with respect to cost, reliability, accessibility, etc.
- Commercial Weather Data Pilot awarding two contracts to GeoOptics and SPIRE. Embarking on Round 2. Building in more operational considerations: data integrity, timeliness, etc.

There are challenges, tradeoffs and opportunities, including the following:

- Small satellites
 - increased demands on ground systems
 - operational stability of data. Few people building reliable smallsats. NAA needs reliability.
- Commercial data services
 - contractual challenge
 - price points
 - operational stability of data
 - data licensing and tensions among commercial interests at different
 - points in the value chain
 - impacts to partnerships, data sharing and R&D (about a third of value to NOAA derives from partnership data exchange)
 - Calibration and validation lifecycle. (breaks down into pre-launch, post-launch, ... end of life). Each phase has special calibration and validation challenges, continually changing algorithms, etc., often triggered by users. When this is layered onto all the earlier stuff, the thorniest challenge is where do we draw contractual boundaries for this part of the commercial data buy.

Miniaturization does provide incredible opportunities but have to rework all the contractual stuff.

In conclusion, there is limited of time and a dynamic environment including technology, commercial, partners and its means all this planning has many moving parts. Discussion ensued on the topics of in situ calibration and validation, both innovation and conservative effects of policy, how to incorporate science with the need for instrument development.

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